Laboratory Research Logistics – What is basic research and how do we support the lab?

Matthew J. Sikora, Ph.D.

Assistant Professor - Department of Pathology

Follow @mjsikora @SikoraLab

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- What is basic laboratory research?
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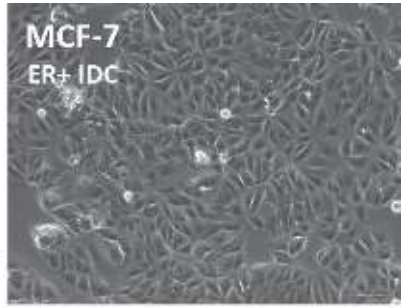
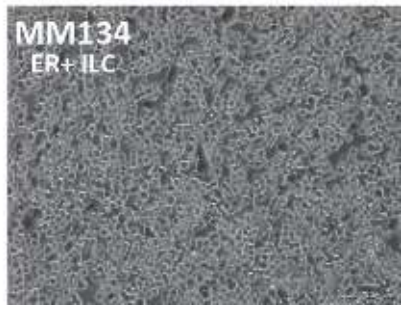
Basic science research us develops the ideas that ultimately transform clinical care.

Basic cancer research uses "model systems" to mimic cancer in the lab

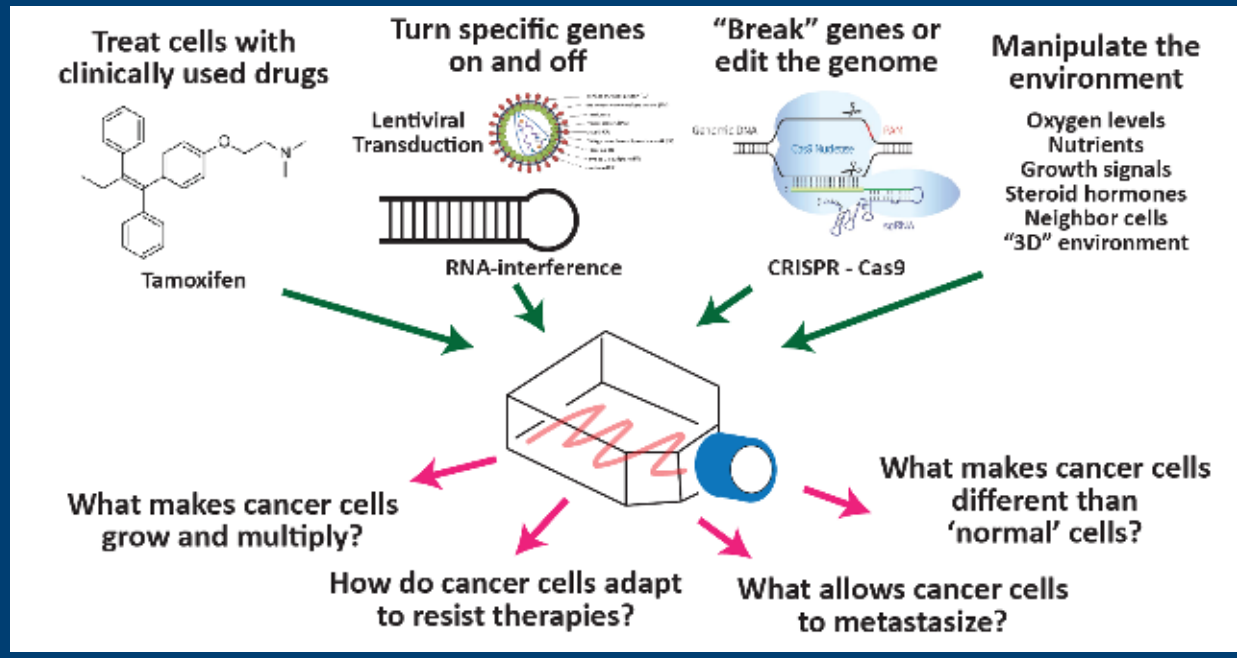
"**Incubators**" help us keep cells in an environment similar to the body

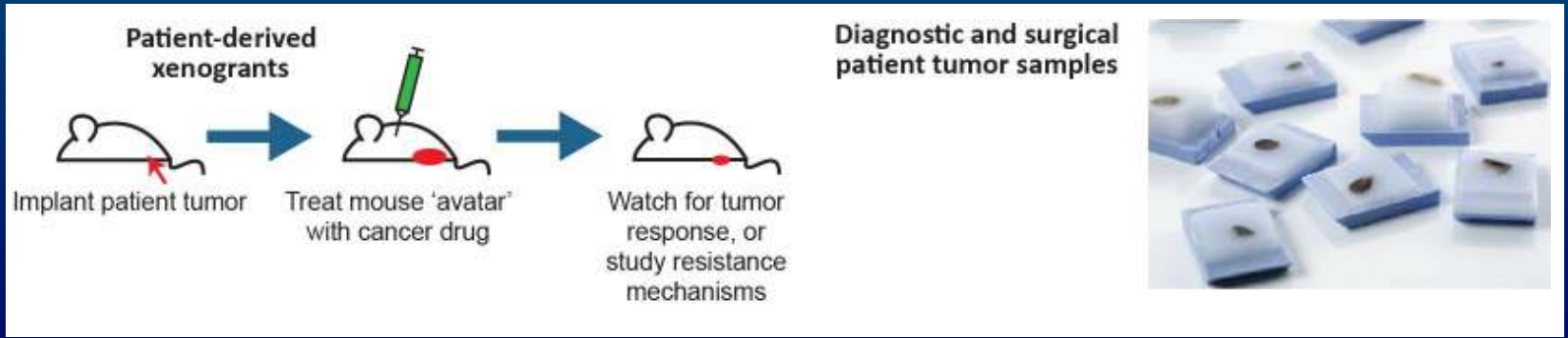
Let's take a closer look in the microscope....





We use models to test new ideas





Diagnostic and surgical patient tumor samples

Develop new diagnostics, biomarkers, therapies

Conceptualize research

Get Funding

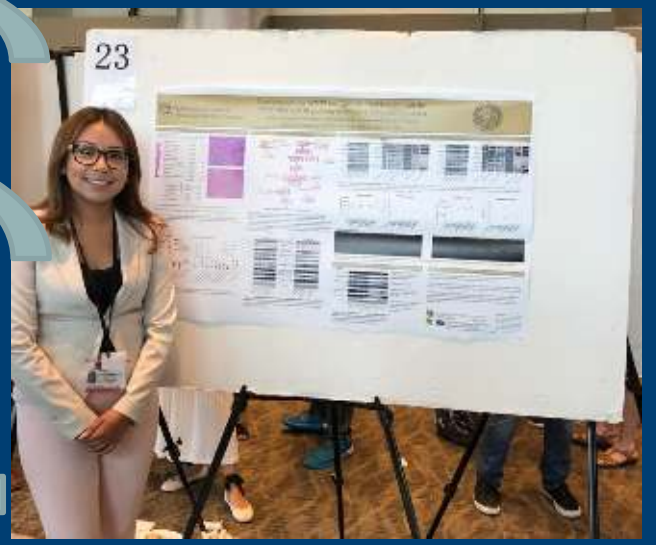
Do the research

Present the research

Publish the research

Do more research

Get more funding



Conceptualize research

How do unique "partner" proteins change ER function in ILC?

Fall 2016

Get Funding

ACS / UCCC Pilot $30k

Jan. 2017

Do the research

Get more funding

Cancer League CO - $30k — July 2019

RNA Biosciences - $10k — Jan. 2021

American Cancer Society - $700k — Sept. 2020

Do more research

Present the research

- U. Utah Seminar
- Local CU seminars
- U. Pitt Seminar
- FASEB Conf.
- Lobular2021
- ENDO2022

Publish the research

Pre-print 12/16/20

Submitted 1/11/21

Revised 3/31/21

Revised again 4/16/21

Accepted 4/28/21

Published 5/4/21

Funding to first publication: 4 y, 4 mo

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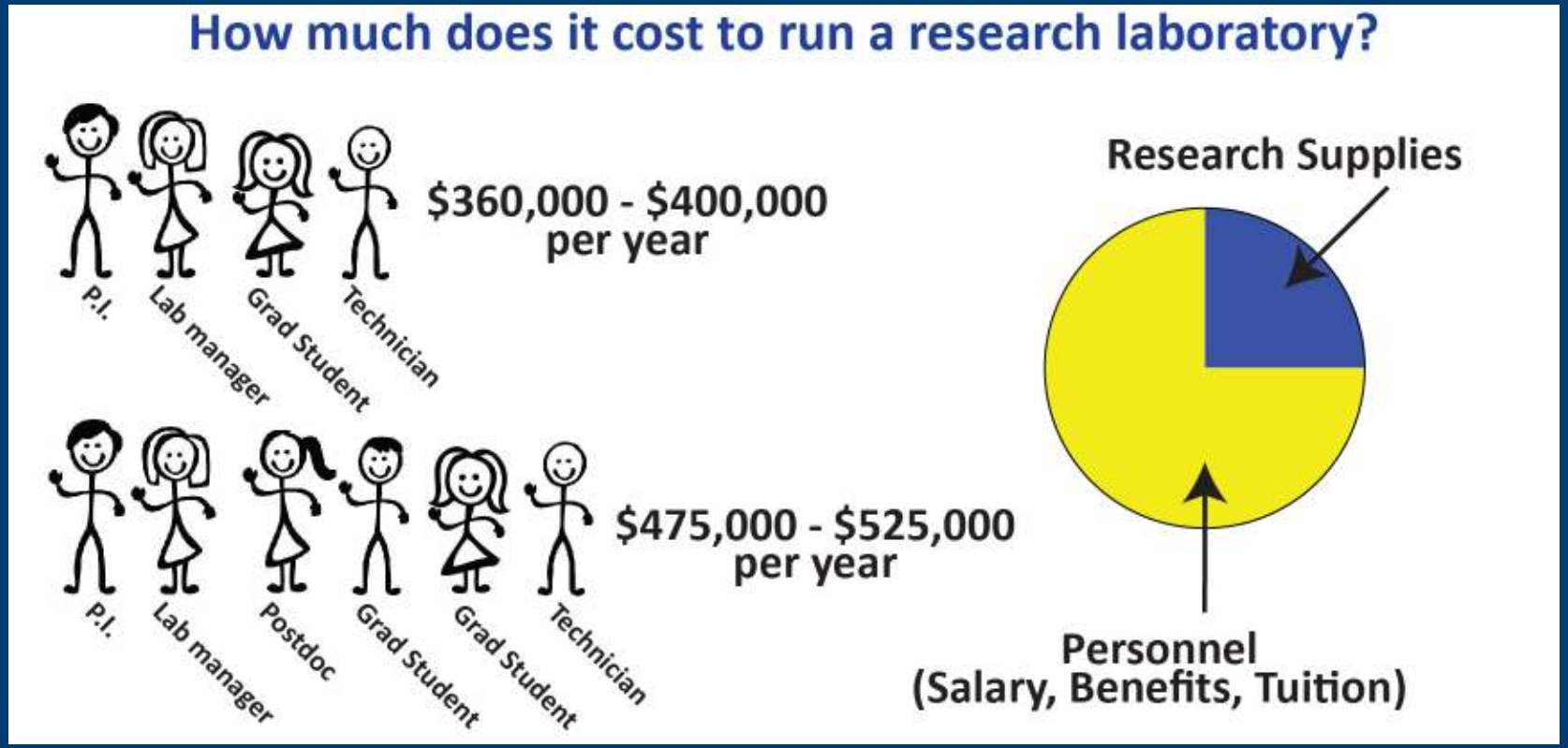
Basic Research Laboratory Personnel

- **Principal Investigator (PI)**
  - PhD/MD; Assistant Professor → Associate Professor → Professor
  - $80k - $200k / y based on level and additional admin roles
- **Staff scientist**
  - PhD; may be non-tenure track faculty
  - $60k - $100k / y
- **Graduate student**
  - BS/BA, MS; training for PhD (or MS)
  - $32k - $40k / y, + $5k - $15k / y tuition
- **Research Technician**
  - BS/BA, MS; may be lab manager
  - $35k - $90k / y, per expr / skillset
- **Postdoctoral Fellow**
  - PhD; ~training position after doctorate
  - $55k - $65k / y
- **Clinical Fellow**
  - MD; 12-18mo research during fellowship
  - Varies per fellowship setup
- **Trainees**
  - Undergraduates, Postbac fellows, Medical students, etc.

- **PIs are responsible for <u>all</u> salary, tuition, & benefits via grants**

Most research costs are personnel



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Supplying a basic cancer research laboratory

"Consumables"

- Plastics (tubes, flasks, tips, etc): varies
- Gloves: ~$50 / box (pandemic!!!)
- Pipettes: $200 - $300 each + annual maintenance
- Cell growth medium ($20 - $200 / L)
- Bovine serum for growth medium ($600 - $1500 / L)
- Purified growth factors ($ a lot)
- Antibodies ($300 - $500 "each")
- Specialized experimental reagents, compounds, etc.
- Next-generation sequencing ($200+ / sample x dozens)
- "Core" equipment fees: $25 - $200 / hr

→ **Total: ~$20k - $30k+ per person per year**

"Capital equipment"

- Incubator: $6k - $10k each
- Biosafety cabinet: $12k - $20k
- Centrifuges: $5k - $20k each

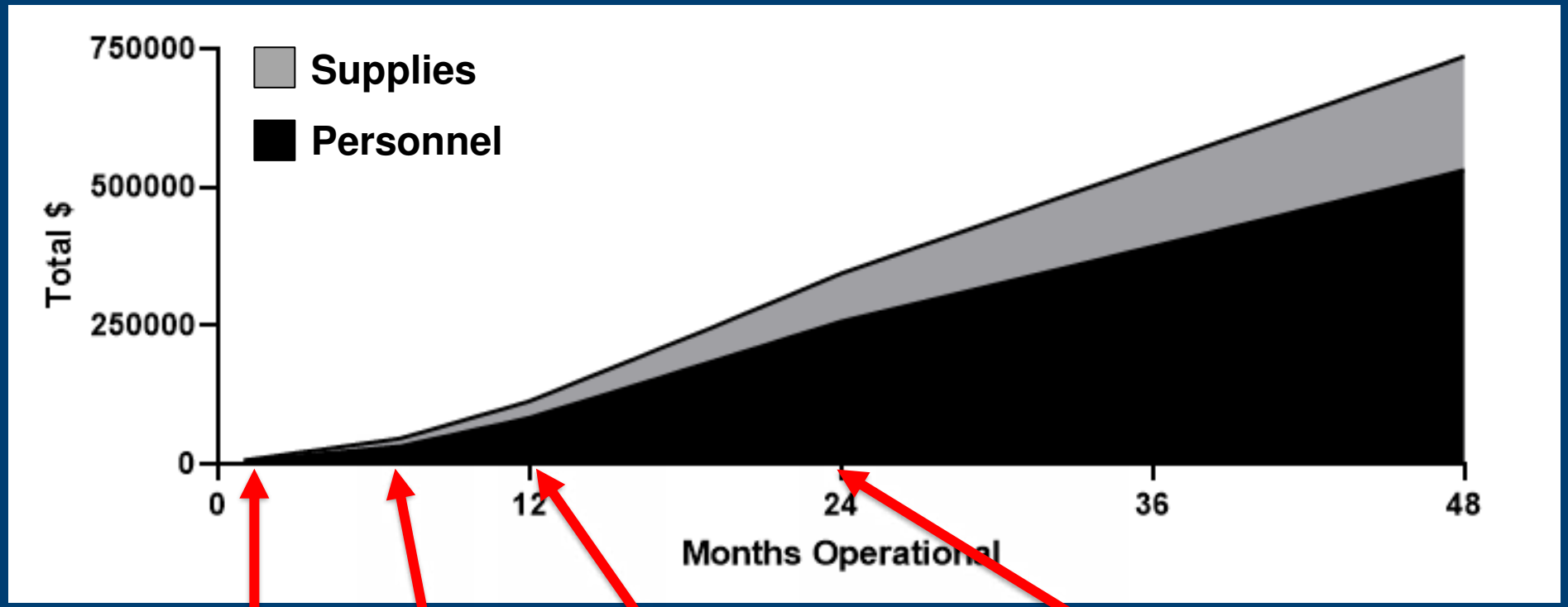
In vivo (animal) studies

- One immunocomp. mouse = $80 - $120
  - Housing: ~$1.10 / day / cage
    - One tumor study: 50 mice = $5,500
    - 10 cages x 8 weeks = $616

Publishing et al

- Publication fees: $1000 - $10000 / article
- Conferences: $2000 - $3000 for nat'l conf.

Costs add up rapidly even for new small labs



*No add'l grants

No equipment
No animal studies
No big 'omics
No PI salary

Tech hired:
$40k/y salary,
$54k/y +fringe

Postdoc hired:
$55k/y salary,
$70k/y +fringe

Grad Student joins:
$34k/y salary,
$50k/y +tuition/fringe

Grad Student gets T32:
~85% coverage

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Sources of funding for cancer research

- New lab "start-up" funds from institution
  - Brand new labs (median $750k) or recruitments
- Federal: National Institutes of Health, Dept. of Defense
- Foundations: American Cancer Society, Susan G. Komen, state/regional foundations (Cancer League of CO, Dynami, LBCA)
- Philanthropy/Endowments: uncommon but critical; "grateful patients", Lobular Breast Cancer Research Fund @ CU Anschutz
- Industry: clinical trials; "contract" research or deliverables focused, less common for basic research

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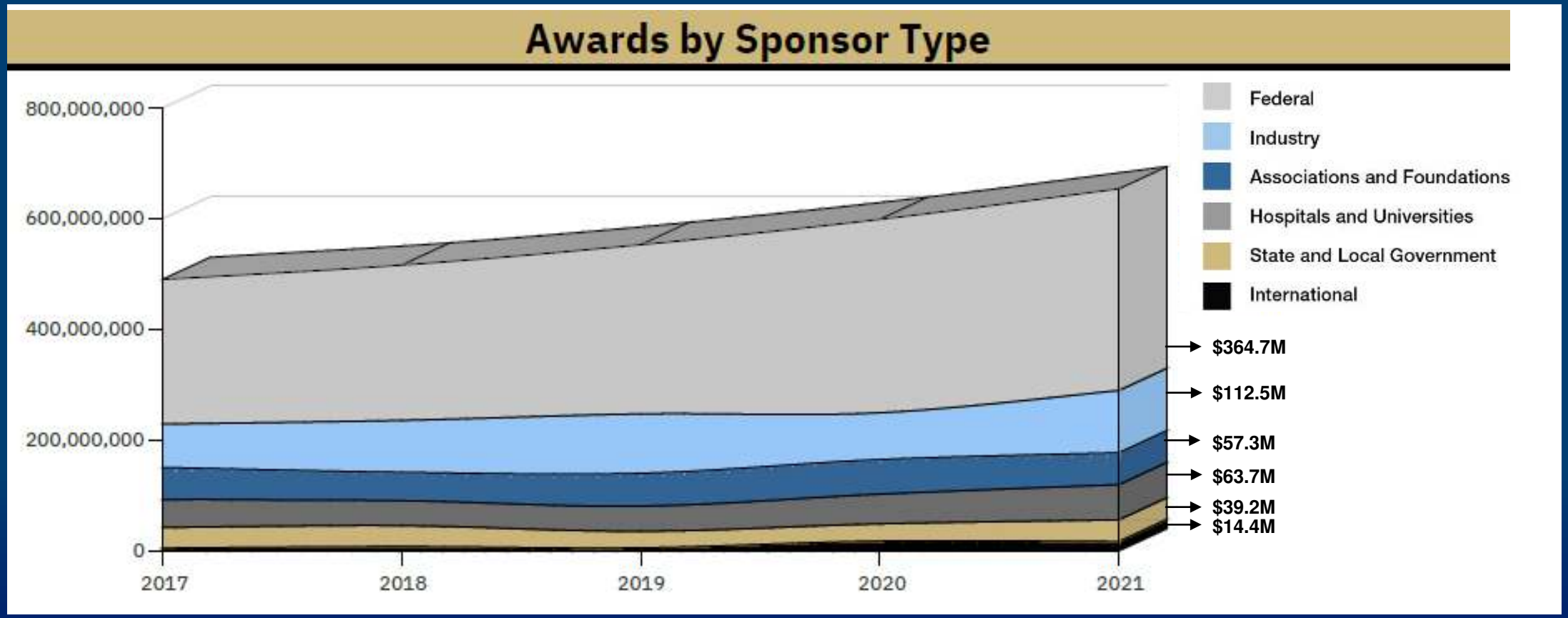

*All grant funded research campus-wide, not limited to basic research

Funding limitations slow research progress

National Cancer Institute “Research Project Grants”: ~$2,600,000,000 / yr

ILC:
10-15% of cases

~0.5% of research funding

Grant:	Funding	Success Rate
NCI R01	$250k-400k / yr	10-11%
DoD BCRP	$125k-350k / yr	6-7%
ACS RSG	$165k / yr	‘queue’
Dr. Sikora (‘lifetime’ as PI)	~40 grants, ~$15.7million	11 grants, ~$1.8million (11.4%)

Limited funding = Years in peer review and revision = 100’s of hours writing =

Years between idea conception and research initiation

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Grant writing and submission

Revise & Resubmit

Rejected

4 – 12+ months

Write grant

- Literature searching
- Constructing goals
- Build collaborative team
- Drafting
- Feedback from colleagues

1 – 12+ months

Submit and Wait

Peer Review

3 – 6 months

Receive reviews

- May or may not include funding decision

Await "programmatic" reviews

0 – 3 months

Awarded

Award Negotiation

- Paperwork
- "Indirect" funding
- Regulatory approvals

Submit and Wait

1 – 6 months

Funding!

Funded on the first try?
4-12 months

Via resubmission cycles?
Years

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Write grant

- Literature searching
- Constructing goals
- Build collaborative team
- Drafting
- Feedback from colleagues

Does the proposed research have the potential* to impact patient needs?

Are the proposed goals going to address a significant clinical concern for patients?

Are the proposed new interventions going to be tractable for patients?

Does the proposed research equitably serve different patient populations?

Will research outcomes be available to the patient/advocate community?

Will research outcomes be made accessible to the patient/advocate community?

Research Methods & Design

Research Communication & Outreach

- Reach out to local researchers directly or via regional NCI-designated Cancer Center

https://www.cancer.gov/research/infrastructure/cancer-centers/find

- Reach out via LBCA

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- Lori Petitti – BCRP Consumer Reviewer
- Nikhil Bhat – SRP Consumer Story
- SFC Paul Bobish: A Combat Medic's Perspective
- Melissa Nunn: Integrating as a Spinal Cord Injury Lived Experience Consultant within the Hiremath Research Team
- Joan Block: Turning the Stigma of Hepatitis B into a Foundation for Hope

Consumer Involvement

> *"It is intellectually challenging and a big commitment. But that is part of what I like so much about serving as a Peer Reviewer: it's hard work but you come away from it feeling as if you have made a significant contribution; it is incredibly rewarding."*
>
> - Linnea Duff, *LCRP*

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